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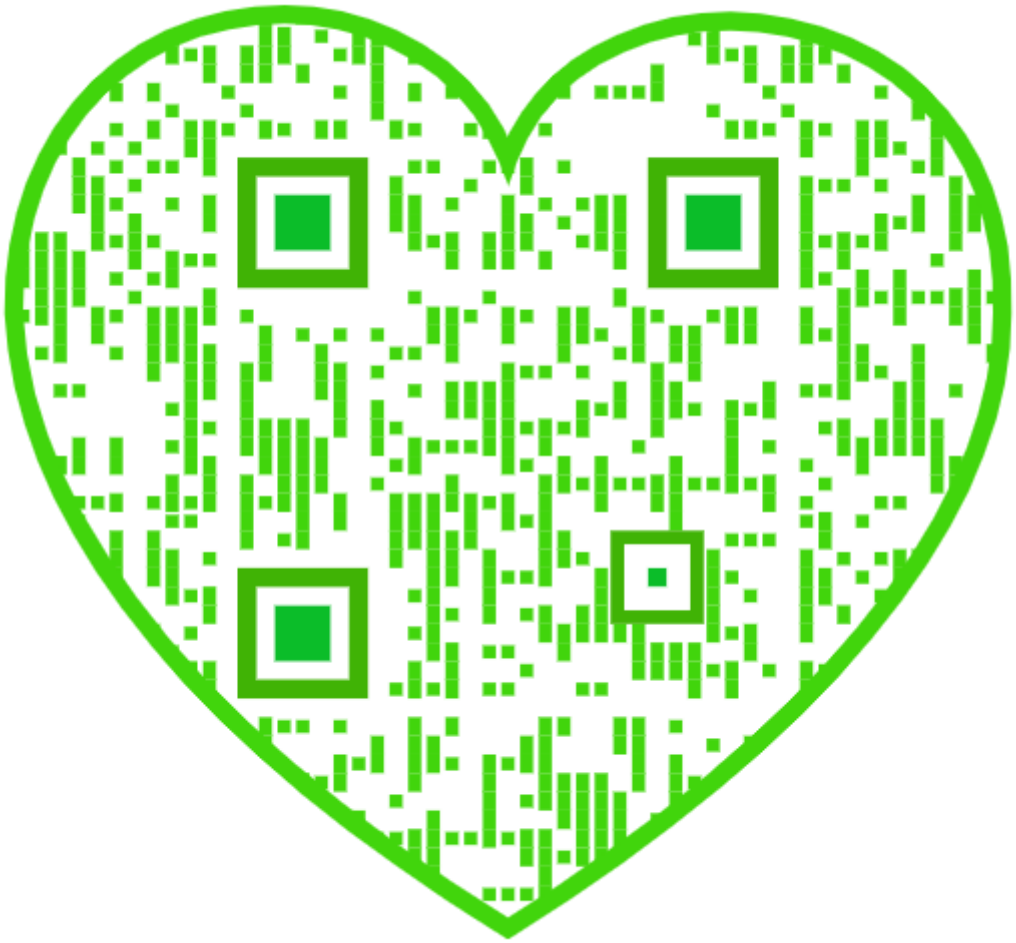

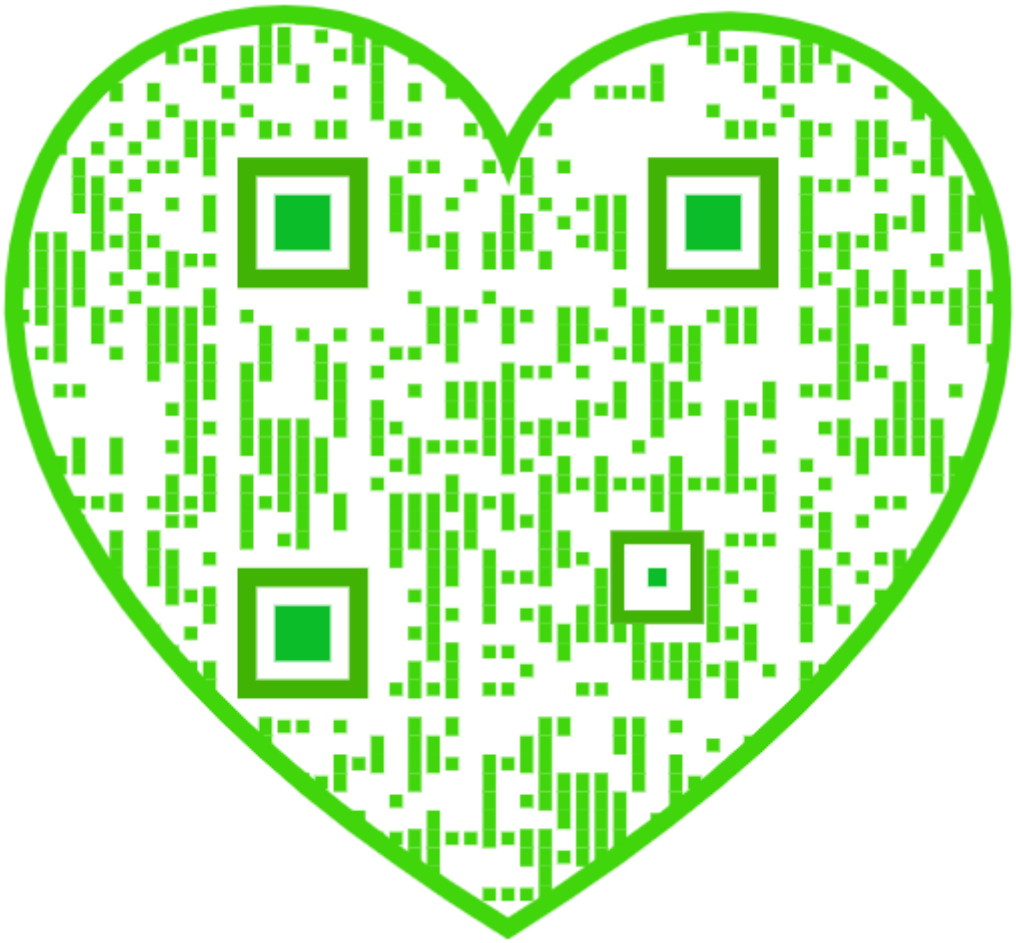

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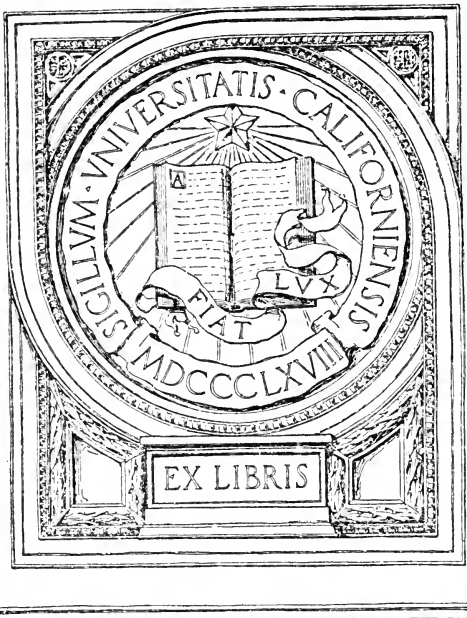

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Rural School Sanitation

Prepared By

N. C. Macdonald, M. A.

State Inspector of Consolidated, Graded and Rural Schools for the State of North Dakota.

Published by the State Board of Education,
of North Dakota, December, 1913.

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INTRODUCTION

Health is the most priceless possession of childhood; for without it in youth there can be no men and women of strong character and trained intelligence. It would be better far that the child grew up in blissful ignorance of men and letters than that his health should be permanently injured. Yet in many rural schools, the health of children is seriously impaired. The poorly ventilated, improperly heated and lighted room, is sometimes sufficient to break down the constitution of the most robust man or woman who may preside as teacher. I have known several cases. This being the effect upon the adult, the question naturally arises as to what must be the effect upon that young and growing body. Then there are some other conditions that affect adversely the health of children; for there are unsanitary closets, drinking utensils and seats. I wish at this place to make a few suggestions and recommendations that from experience and study, I believe, are practicable and necessary for the conservation of the health of children.

1. Lighting.

Some children enter school with normal eyesight to leave it with eyesight seriously injured. Rarely does prolonged study do this, but study under adverse conditions often does. The light should come from one side. This should be the left for the pupils. The best light is from the north, for it is mild and soothing to the nerves and eyes of children. The lighting area should be at least 20 per cent of the floor space There should always be, however, some window space to admit sunlight from the east or west for purposes of air purification. The windows on the left side should be wide and deep. This means that they should be at least three feet in width and extend from the ceiling to within about three feet of the floor. This is to give sufficient light to the pupils and a chance to rest eyes and minds by looking out into the fields or roads or into the sky. Shades should be green in color and should be hung from the top and not the bottom; for they are not to hinder vision from

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within or without, but to regulate the amount of light. Blackboards should be arranged so as to prevent a glare from their surface. This calls for good blackboards properly placed. The best and cheapest in the end is slate which should be placed as far as possible directly in front of the pupils. Books and furniture should have smooth or dull surfaces and not polished or glazed.

2. Heating and Ventilating.

There is probably no one piece of apparatus in the school that has more to do with the success of the pupil than has the heating and ventilating system in use. There is no natural element more essential to good health than an abundance of fresh air. This is particularly true for children and yet great numbers of them are often deprived of it. Some school buildings seem to be ventilated on the principle that air was made to eat instead of to breathe, or in other words, they are not ventilated at all. The ideal condition would of course be for children to do all of their play and work in the open air. This would be the best system of ventilation. But children cannot always be out playing and working in the open air. The next best system is that of the open door and windows. Yet this, too, can be used only for limited periods during a portion of the fall and spring months. But no matter what kind of modern system of ventilation is used, the rooms should be flushed with fresh air by means of the open door and window 5 or 6 times each day and the children and teacher should go out to play during the intermissions. However, rooms must be artificially heated and ventilated in a climate such as ours for the major portion of the school year; and here I shall briefly describe three of the most common systems of heating and ventilating for use in rural, graded and consolidated schools.

(1) **The Steam Plant.** For purposes of heating and ventilating, this is practicable in buildings of three or more rooms; and when used the fan system of ventilating should be installed. However, the gravity system of ventilating can be used, and when it is, the following requirements should be observed:

(a) **Fresh Air Flue.** Fresh air should be admitted through a stack of coils that provides at least 60 square feet of radiation for every square foot of cross-section area of fresh air flues. The fresh air should be delivered into the rooms at

about 7 feet above the level of the floor. In no case should the fresh air be admitted through registers in the floor; for here the air is cool and foul and will therefore pollute and cool the fresh air before it is used. The fresh air flues should have a cross-section area of at least one square foot for each group of ten children.

(b) **Foul Air Flue.** The foul air flue should be on the same side as the fresh air flue, have the same cross-section area, and remove the air at the level of the floor. It should be provided with at least 30 square feet of steam coils to insure an upward movement. In no case should the foul air be returned to the basement, but it should be taken up and outside. When not more than two rooms are used, the foul air may be removed as in the case of the hot air plant, otherwise there should be especially constructed foul air flues.

(2) **The Hot Air Plant.** For a one or a two room school building, this is more economical than the steam plant and if properly installed is just as serviceable. Within the past two years, I have seen 9 of these plants in use in the rural schools but there were only two that I could pass. The same proportion held for graded and consolidated schools. The aim of the contractor or selling agent seemed to be to heat the building at any cost regardless of the health of its occupants Thus there were no fresh air flues while the foul air flues conveyed the air back to the furnaces. For the lack of a better name, I have described this most vicious method of non-ventilation as the "death circle system." The air is taken from the schoolrooms to the furnace where it is heated, sent back to the rooms where the children breathe it; and where some fill it with all kinds and numbers of disease germs. This air is then taken to the furnace to be again heated, but just enough to make the germs multiply more rapidly and be more active than before, when the air with its messengers of sickness and death is sent back to the rooms. A more vicious system could hardly be devised. If properly constructed and installed and cared for, however, the hot air plant is a serviceable system of heating and ventilating. When used the following requirements should be observed:

(a) **Fresh Air Flue.** The fresh air flues should have a cross-section area of at least one square foot for each group of ten children, and should take the air directly from the outside to the furnace. The warm fresh air flue should be of the same

dimensions and should take the air into the room at about seven feet above the level of the floor. In no case should the air come in through a register in the floor.

(b) **Foul Air Flue.** The foul air flue should connect with the ventilating flue in the chimney and its cross-section area should be that of the fresh air flues. In no case should the foul air be returned to the furnace or basement to mix with the fresh air.

(c) **Chimney.** The chimney should be built from the ground up, and should be flush with the building, that is, not more than one side should be exposed. It should be sufficiently large on the inside to allow for a ten-inch metal stack for the entire length, and in addition 20x20 inches should be allowed for each room. Chimneys with double bricked flues or with tile stacks will not heat the flues sufficiently to cause an upward movement of the foul air. When two foul air flues open into the chimney, on the same floor, there should be a partition extending up about four or five feet in order to prevent a cross-current between the rooms The foul air exits must also be on the same side as the fresh air flue openings.

(d) **Humidifier.** There should be some suitable vessel to hold a sufficient supply of water to furnish the proper amount of moisture to the air, otherwise health must suffer. Often this is overlooked in the use of the hot air plant.

(3) **The Jacketed Heater.** This is often referred to as the patented system of room heating and ventilating. It is without doubt the most economical and practicable for one or two-room school buildings. I have seen it used in four-room buildings with as much success as the hot air system. Here of course the janitor service required makes its use objectionable. To be properly contructed and installed, the following conditions should be observed:

(a) **Foul Air Flue.** This flue should be a metal pipe of about 15 inches in diameter located not less than four feet from the shield and reaching to within four or five inches of the floor. It should connect with the chimney so that the foul air may mix with the smoke and pass up and out. This flue may also be in the chimney proper in which case an opening would be made at the level of the floor and a device inserted to prevent interference with the draft of the smoke pipe. In either case, the foul air flue must have a cross-section area which allows a square foot for each group of ten children.

(b) **Fresh Air Flue.** It should have the same cross-section area allowing a square foot for each group of ten children, and must bring the air in between the heater and the shield. A piece of metal should be used to keep the cold air from dropping down to the floor before being heated. Warm air cannot be secured by having the fresh air flue open under the heater, for the bottom of the heater is cold, and the result is that the floor is flooded with cold air.

(c) **Chimney.** The Chimney flue for the passage of foul air and smoke should be at least 18x18 inches in the clear on the inside. This will provide for about 22 pupils when a cross-section area of at least one square foot is allowed for each group of ten children. The chimney should be on the entrance side of the building as also should the heater. This will save much labor and loss of heat, as well as give more blackboard space.

(d) **Heater and Shield.** The stove should be of the upright variety and of ample capacity. A floor furnace may be used with success if properly constructed and installed. The shield or casing should be of Russian iron or copper plated steel with a lining of asbestos. The casing should be about six inches from the stove or furnace, and its lower edge should be at least 12 inches from the floor.

(e) **Humidifier.** There should be within the shield or casing an evaporating pan for the purpose of keeping the air moist. This should be carefully attended to.

3. Closets or Outhouses.

The outside closet in some schools has probably done more to injure the health and lower the standard of morals than all other agencies combined that we find in and about the school. The outside closet should be forbidden by law. There is no excuse for it in this day when for so little cost the inside closets can be installed. It is exceedingly difficult to keep the outside closet in a wholesome condition. For exercise what care you will there will be times when they cannot be properly used. For instance, inclement weather often prevents their use by young children. Thus the health and morals must suffer. Then they are often broken into after school hours, and sometimes left in an obscene and filthy condition. These things cannot happen if the inside closets are used. However, we have the outside closets in practically all the rural schools at the pres-

ent time. These evils connected with their use can be greatly diminished if the following suggestions are observed:

(1) **Outside Closets.** They should be two in number, under separate roofs, not less than forty feet apart and to the rear and side of the building, with separate means of access by use of a board wall. They should be sand painted inside and out to prevent marking and scribbling. The doors should be double with the outside door a sliding one to prevent damage due to ice and snow. The vaults should be deep and large and should be cleaned twice each year. Each closet should be furnished with toilet paper. The boys' closets should be furnished with ample urinal facilities. Each should be provided with a barrel containing a mixture of earth and quicklime to deodorize and dry up the excreta. They should be scrubbed at least once each month and swept clean each day with some sweeping compound. The teacher should have the keys to each, locking them each evening and unlocking them each morning. This would insure personal inspection by the teacher at least twice each day. Then no loitering or visiting should be permitted in or around these buildings, as is too often the case. The approach should be screened with lattice work and shrubbery. These things can be done, for I have seen such within the past six months. For a small sum, however, inside closets can be had where health and morals can be protected in a way not now possible when the outside closet is used.

(2) **Inside Closets.** By moving the outside closets up to rear of the school building and connecting them with enclosed passage-ways one form of inside closets can be secured. This has been done and with success. The same sanitary appliances should be used as have been suggested for the outside closets. Then, too, inside closets can be built in as a part of the school building and provided with sanitary dry or liquid vaults. These vaults can be secured for about $30, each. If the basement is used then this is the place to put the closets. If not, the best place is at the entrance ways in connection with the cloak rooms. If this cannot be done, then build on at the rear of the building or connect the closets already built and use either the dry or liquid vaults. Any of the changes need not cost more than $75.00. If the outside closets are used it can be done for $25.00. For the sum of $350.00 a well or a cistern, pressure tanks, a pump, an engine, and septic tanks can be installed which will flush all the closets needed. This is the best solution to the closet problem.

4. Water.

Youth demands water and plenty of it. Yet this is one element that the children are often deprived of. Dirty faces and hands are but the least of the trouble in this respect. The great trouble is to get a sufficient supply of wholesome water for drinking purposes. The feverish haste with which children surround the drinking pail is evidence of this undesirable condition. There are several ways of supplying good drinking facilities.

(1) **The Closed Vessel and Individual Cup.** The state law now prohibits the use of the common drinking cup in public places, which includes the public school. This is a wise provision. A ten gallon jar with a cover and faucet at bottom and the individual cups should be furnished by the board. There should be a well or a properly cared-for cistern on the premises. If not, some pupil should be hired to bring the water from home or from a neighboring farm each day.

(2) **The Sanitary Fountain.** This is the covered jar with the bubble faucet at the bottom. It should be a 12 gallon jar with a diameter of not more than 10 inches in order to insure the necessary pressure. It is much better than the closed vessel with the individual cup. It costs more and uses more water usually, but it is more sanitary in every way. The better grade should be purchased which costs about $20.00.

5. General Sanitary Provisions.

(1) **Screens.** Screen doors and windows should be provided for all schools. There is no excuse for permitting flies to come and go bringing and leaving disease germs, when screens on doors and windows will reduce this to a minimum.

(2) **Floors.** Floors should be swept daily and mopped weekly. A sweeping compound should be used. The janitor work should be done by some one other than the teacher. Teachers need the time so used for recreation in the open air or for the preparation of and doing of her regular school work

(3) **Desks and Seats.** These should be single and adjustable. The best of care should be taken to see that all the pupils are properly seated so as to prevent malformation of the body in any way.

(4) **Wash Room.** A portion of the school room should be used for a wash room. This means that soap, wash basins, and individual or paper towels should be furnished by the district, and that a cistern or a well be on the grounds. There are times when children can be dirty, and without injury to health or offense to good taste, but not in the schoolroom.

(5) **Hot Lunch.** Some one portion at least of the noon day lunch should be served hot. This calls for a gasoline stove and a few cooking utensils which in all need not cost more than $5.00 or $6.00. It also calls for a little skill and kindly interest on the part of the teacher. Each family can take turns in furnishing the material for the hot portion of the lunch. There are several schools where such is now done with much success.

(6) **Recreation.** Next to air, food and water, children need their hours of recreation. This means abundance of play in the open. The intermissions should be used by the teacher and pupils for the playing of simple and wholesome games. These should be played outside when the weather will permit.

(7) **Medical Inspection.** Unsafe or unsanitary school buildings should be condemned by the county board of inspection. The responsibility for this lies, in the first instance, with the teacher and then with the superintendent. Medical inspection should be required in all schools. The teacher should encourage the board to provide for such inspection which the law now leaves to the discretion of the school boards.

(8) **The School Building.** To properly safeguard the health of the school children, the school building should be sanitary in all its appointments. This means that what has been said here concerning lighting, heating, ventilating and closets applies to the construction of the school building. In addition the building ought to be sufficiently large to allow at least 12 sq. ft. of floor space and 200 cu. ft. of air space for each and every pupil. The ceiling should be at least 12 ft. in height. There should be a full basement to provide for, among other things, play-room space that would be available during inclement weather. No school building should be planned and built until the plans have been approved by competent authority.

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